Patent
Docket No.: 1200323N US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:
David JARUS, Jeff CICERCHI, Guoqiang QIAN, and Tie LAN

Serial No.:	10/595,282
§371 Date:	April 4, 2006
PCT Serial No.:	PCT/US2004/032650
PCT Filed:	October 1, 2004 (1.10.04)

Examiner: P. Niland

For: NANOCLAY-CONTAINING COMPOSITES AND METHODS OF MAKING THEM

VIA EFS-WEB
Conf. No.: 6688

Re-submission of Appeal Brief

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicants re-submit their appeal brief following the Notice of Non-Compliant Brief mailed on December 27, 2007. Applicants have already paid their filing fee. If any other amount is required, the Office is authorized to charge Deposit Account No. 07-1077.

Respectfully submitted for Inventors Jarus and Cicerchi by:

John H. Hornickel
Registration No. 29,393
PolyOne Corporation
33587 Walker Road
Avon Lake, Ohio 44012
Telephone: 440-930-3317
Fax: 440-930-1179
John.Hornickel@PolyOne.com

Date January 3, 2008

Respectfully submitted for Inventors Qian and Lan by:

Richard H. Anderson
Registration No. 26,256
c/o PolyOne Corporation
33587 Walker Road
Avon Lake, Ohio 44012
Telephone: 312-474-9556
Fax: 312-474-0448
randerson@marshallip.com

Date January 3, 2008

I hereby certify that this paper is being transmitted to the United States Patent and Trademark Office on the date shown below to the EFS-Web in Private PAIR:

January 3, 2008
Date

Signed
John H. Hornickel, Reg. No. 29,393

TABLE OF CONTENTS

	Page No.
Real Parties in Interest	3
Related Appeals and Interferences	4
Status of Claims	5
Status of Amendments	6
Summary of Claimed Subject Matter	7
Grounds of Rejection to be Reviewed on Appeal	9
Argument	10
Claims Appendix	15
Evidence Appendix	18
Related Proceedings Appendix	19

REAL PARTIES IN INTEREST

This application is assigned to both:

PolyOne Corporation, a corporation organized under the laws of the State of Ohio and having its headquarters at 33587 Walker Road, Avon Lake, Ohio 44012 and

Amcol International Corporation, a corporation incorporated under the laws of Delaware and having its headquarters at One North Arlington, 1500 West Shure Drive, Suite 500, Arlington Heights, Illinois 60004-7803. The work done on this application by Inventor-Appellants Qian and Lan occurred at a subsidiary of Amcol International Corporation called Nanocor, Inc.

RELATED APPEALS AND INTERFERENCES

Appellants, their respective Assignees, and their respective Legal Representatives do not know of any other prior or pending appeals, judicial proceedings or interferences which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Twenty (20) claims were originally filed in this application upon its entry into US National Stage. Those Claims 1-20 are pending and on appeal.

The Office has rejected Claims 1-20 under 35 USC § 112, first paragraph (written description.)

The Office has rejected Claims 1-20 under 35 USC § 102(b) as anticipated by U.S. Patent Application Publication No. 2002/0156171 A1 (Drewniak et al.).

The Office has rejected Claims 1-20 under 35 USC § 103(a) as unpatentable over U.S. Patent Application Publication No. 2002/0156171 A1 (Drewniak et al.).

STATUS OF AMENDMENTS

All amendments submitted to the Office on April 5, 2007 were entered by the Office before rejection of Claims 1-20. There are no amendments pending. The Claims in the Appendix embody this status.

SUMMARY OF CLAIMED SUBJECT MATTER

With respect to Independent Claim 1, from which all others depend directly or indirectly, the claimed nanocomposites comprise:

(a) thermoplastic matrix polymer;

(b) nanoclay; and

(c) a compatibilizing dispersion agent. (Page 2, Lines 6-11)

The nanocomposite benefits from a particular ratio of nanoclay and the compatibilizing dispersion agent. (Page 2, Lines 22-27) The nanocomposite also benefits from a minimum amount of nanoclay present in the matrix. (Examples 5-16 and 35 on Pages 9-11 and 15)

Nanoclay is a clay from the smectite family. Smectites have a unique morphology, featuring one dimension in the nanometer range. Montmorillonite clay is the most common member of the smectite clay family. The montmorillonite clay particle is often called a platelet, meaning a sheet-like structure where the dimensions in two directions far exceed the particle's thickness. (Page 4, Lines 9-14)

Nanoclay becomes commercially significant if intercalated with an intercalant. An intercalate is a clay-chemical complex wherein the clay gallery spacing has increased, due to the process of surface modification by an intercalant. Under the proper conditions of temperature and shear, an intercalate is capable of exfoliating in a resin matrix. An intercalant is an organic or semi-organic chemical capable of entering the montmorillonite clay gallery and bonding to the surface. Exfoliation describes a dispersion of a surface treated nanoclay in a plastic matrix. (Page 4, Lines 15-22)

Nanocomposites offer flame-retardancy properties because such nanocomposite formulations burn at a noticeably reduced burning rate and a hard char forms on the surface. They also exhibit minimum dripping and fire sparkling. (Page 5, Lines 10-13)

Optionally, but preferably, the nanocomposite contains a polyolefin elastomer to enhance impact resistance. (Page 2, Lines 10-11)

Examples 1-17 and 35 (Pages 9-11 and 15) in the patent application demonstrate the value of a weight ratio of nanoclay to compatibilizing dispersion agent of greater than 3.1:1 and less than 10:1.

Examples 5-16 (all at 8%) and Example 35 (at 12%) in the patent application demonstrate the value of a nanoclay concentration of at least 8 weight percent.

The invention unexpectedly improves on the work of the Amcol Corporation Inventor-Appellants Qian and Lan, as disclosed in US2001/0033924 A1 (Qian et al.) which became U.S. Pat. No. 6,632,868 (Qian et al.) and was identified in the Background of the Invention (Page 1, Line 26).

Grounds of Rejection to be Reviewed on Appeal

1. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

2. Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pat. Application Publication No. 2002/0156171 A1 Drewniak et al..

3. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat. Application Publication No. 2002/0156171 A1 Drewniak et al..

ARGUMENTS

1. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The Office rejected the addition to Claim 1 of the phrase "at least about 8 weight percent of the nanocomposite" nanoclay in the nanocomposite stating, "Particularly, there not basis for the newly recited endpoint of 'about 8 weight percent'."

Appellants believe their application satisfies the written description requirement of 35 USC §112 because their Examples 5-16 demonstrate actual reduction to practice of nanocomposites with 8 weight percent of nanoclay and their Example 35 demonstrates actual reduction to practice of a nanocomposite with 12 weight percent nanoclay. All of Examples 5-16 and 35 also met the claimed ratio of a weight ratio of nanoclay to compatibilizing dispersion agent of greater than 3.1:1 and less than 10:1.

The amendment is also consistent with the recitation of a second embodiment, not now claimed, in which the amount of nanoclay desired and preferred was expressed in "at least" terminology because more nanoclay concentration is desirable or preferred, if possible. (Page 2, Lines 12-21) Appellants' Examples 5-16 and 35 are sufficient written description to comply with §112 for Claims 1-20.

2. Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pat. Application Publication No. 2002/0156171 A1 Drewniak et al..

The Office must employ anticipation rejections *very precisely*. An anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of the claimed invention. See *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 221 USPQ 385 (Fed. Cir. 1984). Furthermore, the law of anticipation does not require that the reference teach what the appellant is teaching or has disclosed, but only that the claims on appeal "read on" something disclosed in the reference, i.e., all limitations of the claim

or claims are found in the reference. See *Kalman v. Kimberly Clark Corp.*, 713 F.2d 760, 218 USPQ 781 (Fed. Cir. 1983).

If one agrees with the Office, unfortunately for all who follow Drewniak et al., their very broad expressions of concentrations of ingredients in the combination supposedly "invented" by them poison the ability of later inventors to prove something is new and patentable.

Taken to its absurd extremes, one could file a patent application (with no expectation of ever obtaining a Notice of Allowance) that discloses:

from 0.1 - 99.8 weight percent of a thermoplastic;

from 0.1 - 99.8 weight percent of a functional additive; and

from 0.1 - 99.8 weight percent of a second additive.

and "teach or disclose" a combination that would "anticipate" all later TRUE inventions which have examples to prove actual reduction to practice.

Claim 1 of Drewniak et al. by extrapolation of the extremes of the two weight percents offers a potential range of clay to dispersant of 50:1 to 1:10. Nobody should believe that or rely on that absurdly broad statement. But the proper teaching of Drewniak et al. resides in Paragraphs 0015 -- 0024 of Drewniak et al., *read in conjunction with* the Examples 1-12.

Paragraph 0015 states the absurd extremes of Claim 1 of Drewniak et al. without any demonstration of that performance possibility in the examples of Drewniak et al. Paragraphs 0016 - 0024 are not any better.

The ratios of clay to dispersant in the examples of Drewniak et al. are:

Example 1 -- 1:4

Example 2 -- 4:3

Example 3 -- 4:2

Example 4 -- 4:2

Example 5 -- 4:2

Examples 6-8 -- 4:3

Example 9 -- 4:3

Examples 10 -11-- 4:2

Example 12 -- 4:2.

Nowhere in the Examples of Drewniak et al. is there any demonstration of successful blending of a nanocomposite with a ratio of clay to dispersant of more than 2:1. Even Qian et al. teach a ratio of clay to dispersant of no more than 3:1.

Simply put, Drewniak et al. can not be considered a valid reference for anything other than it has proven to work. In this chemistry, the intercalated nanoclay is quite difficult properly disperse well into the plastic matrix. The compatibilizing dispersing agent is needed, but no one until Appellants were successful in using so little dispersant (>3.1:1 clay:dispersant) compared with so much clay (at least 8%). Appellants have 13 actual working examples which prove their invention; Drewniak et al. have no examples (believable statements) to "teach" or "disclose" what Appellants have claimed in Claims 1-20, now on appeal.

The European Patent Office has a concept for patentability called "selection invention". The claims on appeal here fall into that category, a specific combination showing unexpected properties, notwithstanding the broad text of a published application which fails to support its own assertions with actual proof.

Claims 1-20 are novel over Drewniak et al.

3. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat. Application Publication No. 2002/0156171 A1 Drewniak et al..

The published application of Drewniak et al. also fails to render obvious what Appellants have invented, as now claimed. For much the same reasons as above, Appellants have specifically and actually reduced to practice 13 different examples which meet the scope of Claim 1. Appellants have offered comparative data with respect to Examples 5-16 demonstrating how a nanocomposite TPO is superior to a neat TPO with respect to Flexural Modulus and Stress at Yield. Particularly, Examples 5, 9, and 13 show a balance of stiffness and toughness. Also, Example 35 increases the nanoclay concentration by 50% compared with Examples 5-16 and outperforms the highest of them in Flexural Modulus (Example 12 at 258,000) by 25%.

There is nothing in Drewniak et al. that suggested to one of ordinary skill in the art that one even could move past a ratio of 4:2 clay to dispersant. Confronted with an absurd statement of "about 1 to 100 percent by weight of functionalized polyolefin, and from about 10 to 50 weight percent modified clay...." any one of ordinary skill in the art would have turned to the examples to see what Drewniak et al. actually did prove in the examples. The absurd possibilities of combination (1-100 and 10-50) in Drewniak et al. can not be believed by anyone of ordinary skill in the art. A potential range of clay to dispersant of 50:1 to 1:10? It is simply not plausible or credible and fails to teach, suggest, or motivate anyone.

Working with at least 8 weight percent and a ratio of clay to dispersant of more than 3.1:1 was *beyond the horizon* of whatever Drewniak et al. themselves could prove to themselves and the art, when they filed their patent application. To be fair, Paragraph 0018 of Drewniak et al. does include the possibility of a 4:1 ratio of clay to dispersant but at only 4% concentration of clay in the compound. The latter half of Paragraph 0018 also includes the possibility of a 10:2 ratio of clay to dispersant, but that combination, if true, would have been exemplified with actual data to prove they exceeded in making a nanocomposite well beyond anything anyone had done previously. Even Drewniak et al. were not motivated to prove to scientific certainty a ratio of clay to dispersant of greater than 2:1. If they had been motivated, they would have shown the proof. The easier path was to baldly assert "about 1 to 100" and "about 10 -50" when they had nothing close to those ranges.

Finally, it needs to be noted that the present invention exceeds anything previously seen possible by even two of the four Inventors-Appellants of this patent application. With care, the ratio of at least 3.1:1 was selected for Claims 1-20 because Inventor-Appellants Qian and Lan only were able reach 3:1 as seen in their published application US2001/0033924 A1 (Qian et al.) which became U.S. Pat. No. 6,632,868 (Qian et al.). Please see Examples 3-14 of Qian et al., in which the maximum clay to dispersant ratio stated is 3:1.

If anything, Drewniak et al. (published on October 24, 2002) represents a *regression* in the art from Qian et al. (published on October 25, 2001) in this rapidly emerging nanotechnology. But no one, even two of the Inventors-Appellants, proved

it possible to obtain excellent polymer properties from a concentration of clay of at least 8 weight percent and a ratio of clay to dispersant of from 3.1:1 to 10:1. Appellants have a patentable invention for their ***breakthrough*** effort, not known or obvious to their contemporaries in the art.

Repeated for emphasis: ***no one until Appellants were successful in using so little dispersant (>3.1:1 clay:dispersant) compared with so much clay (at least 8%).***

4. Conclusion

All pending Claims 1-20 satisfy the Written Description requirement of 35 USC §112 and are novel and patentable over Drewniak et al. Appellants respectfully request a reversal of all rejections imposed by the Office against Claims 1-20. Appellants respectfully request the Office to be directed to issue a Notice of Allowance for Claims 1-20.

Respectfully submitted for Inventors Jarus and Cicerchi by:

John H. Hornickel
Registration No. 29,393
PolyOne Corporation
33587 Walker Road
Avon Lake, Ohio 44012
Telephone: 440-930-3317
Fax: 440-930-1179
John.Hornickel@PolyOne.com

Date January 3, 2008

Respectfully submitted for Inventors Qian and Lan by:

Richard H. Anderson
Registration No. 26,256
c/o PolyOne Corporation
33587 Walker Road
Avon Lake, Ohio 44012
Telephone: 312-474-9556
Fax: 312-474-0448
randerson@marshallip.com

Date January 3, 2008

CLAIMS APPENDIX

1. A nanocomposite, comprising:

a thermoplastic matrix polymer, nanoclay, and compatibilizing dispersion agent having a weight ratio of nanoclay to compatibilizing dispersion agent of greater than 3.1:1 and less than 10:1; and

wherein the nanoclay comprises at least about 8 weight percent of the nanocomposite.

2. The nanocomposite of Claim 1, wherein the nanocomposite further comprises a polyolefin elastomer.

3. The nanocomposite of Claim 1, wherein the nanocomposite further comprising ingredients selected from the group consisting of colorants, nucleators, blowing agents, activators which lower the activation temperature of the blowing agent, surfactants, plasticizers, stabilizers, flame retardants, UV absorbers, fillers, fragrances, mold release aids, processing aids, biocides, antistatic additives, anti-microbial agents, lubricants, and combinations of them.

4. The nanocomposite of Claim 1, wherein the nanoclay comprises at least 9 weight percent of the nanocomposite.

5. The nanocomposite of Claim 1, wherein the compound further comprises a thermoplastic polyolefin mixed with the nanocomposite.

6. The nanocomposite of Claim 1 in the form of an article.

7. The nanocomposite of Claim 5, wherein the nanocomposite is mixed with a thermoplastic polyolefin at a point of molding or extruding a final thermoplastic article.

8. The nanocomposite of Claim 7, wherein the thermoplastic polyolefin and the nanocomposite are mixed at a ratio of about 4:1 of thermoplastic polyolefin to nanocomposite.

9. The nanocomposite of Claim 4, wherein the nanocomposite is in the form of pellets for further processing.

10. The nanocomposite of Claim 4, wherein the nanocomposite is in the form of a molded or extruded article.

11. A method of making a nanocomposite of Claim 2, comprising the steps of

(a) adding the thermoplastic matrix polymer, nanoclay, and nanoclay dispersion agent to an extruder; and

(b) adding the polyolefin elastomer downstream from where the thermoplastic matrix polymer, nanoclay, and nanoclay dispersion agent were added.

12. The method of Claim 11, wherein step (a) also includes adding ingredients selected from the group consisting of colorants, nucleators, blowing agents, activators which lower the activation temperature of the blowing agent, surfactants, plasticizers, stabilizers, flame retardants, UV absorbers, fillers, fragrances, mold release aids, processing aids, biocides, antistatic additives, anti-microbial agents, lubricants, and combinations of them.

13. The nanocomposite of Claim 2, wherein the nanocomposite further comprising ingredients selected from the group consisting of colorants, nucleators, blowing agents, activators which lower the activation temperature of the blowing agent, surfactants, plasticizers, stabilizers, flame retardants, UV absorbers, fillers, fragrances, mold release aids, processing aids, biocides, antistatic additives, anti-microbial agents, lubricants, and combinations of them.

14. The nanocomposite of Claim 2, wherein the nanoclay comprises at least 9 weight percent of the nanocomposite.

15. The nanocomposite of Claim 2, wherein the nanocomposite further comprises a thermoplastic polyolefin mixed with the nanocomposite.

16. The nanocomposite of Claim 3, wherein the nanoclay comprises at least 9 weight percent of the nanocomposite.

17. The nanocomposite of Claim 3, wherein the nanocomposite further comprises a thermoplastic polyolefin mixed with the nanocomposite.

18. The nanocomposite of Claim 2 in the form of an article.

19. The nanocomposite of Claim 3 in the form of an article.

20. The nanocomposite of Claim 4 in the form of an article.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None